A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain

Manuscript Details

Manuscript number	ADDICTBEH_2018_939_R1
Title	A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain
Article type	Full Length Article

Abstract

Background: Smoking is a key contributor to health and social inequalities and homeless smoking prevalence rates are 4 times higher than the general population. Research on homelessness and smoking to date has been concentrated predominantly in the US and Australia. This study aimed to describe smoking and quitting behaviour in homeless adult smokers in Great Britain. Data on perceptions of, and willingness to try, e-cigarettes were also gathered. Methods: Cross sectional survey of 283 adult smokers accessing homeless support services in Kent, the Midlands, London and Edinburgh. Participants answered a four-part survey: i) demographics; ii) current smoking behaviour and dependence (including the Fagerström Test of Cigarette Dependence [FTCD]); iii) previous quit attempts; and iv) e-cigarettes perceptions. Results: High levels of cigarette dependence were observed (FTCD: M=7.78, sd+0.98). Although desire to quit was high, most had made fewer than 5 quit attempts and 90% of these lasted less than 24 hours. 91.5% reported that others around them also smoked. Previous quit methods used included cold turkey (29.7%), NRT (24.7%), varenicline (22.3%) and bupropion (14.5%). 34% were willing or able to spend £20 or more for an e-cigarette and 82% had tried one in the past although 54% reported that they preferred smoking. Conclusion: We observed high nicotine dependence, few long-term quit attempts, strong desire to quit and amenability to both traditional cessation methods and e-cigarettes. Community embedded and non-routine approaches to cessation may be promising avenues promoting engagement with the homeless community. Likely barriers to uptake include low affordability, preference for cigarettes and high numbers of smoking acquaintances.

Keywords	Tobacco; smoking; homeless; homelessness; e-cigarettes; inequalities
Taxonomy	Psychology, Special Population

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Suggested reviewers	Elena Ratschen, Travis Baggett, Maya Vijayaraghavan, Hannah Farrimond

Submission Files Included in this PDF

File Name [File Type]

Letter to editor.docx [Cover Letter]

Responses to reviewers comments 9.2.19.docx [Response to Reviewers]

Dawkins et al. homeless survey changes highlighted 9.2.19.docx [Revised Manuscript with Changes Marked]

Highlights.docx [Highlights]

Dawkins et al. homeless survey clean version 9.2.19.docx [Manuscript File]

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Research Data Related to this Submission

There are no linked research data sets for this submission. The following reason is given:
Data will be made available via Research Gate and LSBU Research Open

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Dear Professors Spada, Ritter & Moss

Special Issue on Vulnerable Groups

Please see attached manuscript submitted to the Addictive Behaviors journal:

A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain

This manuscript is submitted for the special issue on vulnerable groups. Dr Moss has kindly approved the delayed submission date for this special issue.

Smoking continues to be a contributing factor of social inequalities associated with poor health outcomes. Homeless adult smoking prevalence rates are higher than any other minority group and quitting rates are amongst the lowest of all at risk groups. The submitted manuscript forms part of our National Institute of Health Research feasibility study, the data presented was collected across five homeless centres, and is the first UK study to assess smoking and quitting behaviour amongst homeless adults. Furthermore, this manuscript adds to the literature as currently there is scarcity of research which has captured data on e-cigarette use, awareness and willingness to use an e-cigarette amongst this population.

This manuscript has not been published or under review with another journal. Thank you for considering our manuscript for publication in your journal.

I can confirm that all authors have contributed to the writing of the manuscript and approve its submission to your journal. I look forward to your response.

Yours sincerely,

L. Dawkins

Dr Lynne Dawkins

We would like to thank both reviewers for their thorough reading of our paper and for their helpful suggestions to improve the quality and clarity of our paper. We have added some content as requested and this has increased the word count from 2695 to 3097.

Reviewer 1

Overall, this is an excellent paper, interesting, well-written and I would welcome its publication adding to much needed literature on smoking and e-cigarette perceptions in homeless populations. A few small points need changing:

Thank you for these positive comments. We have responded to each point below.

1. What does the mean indicate in the abstract (Fagerstrom dependence test)? Need to include this otherwise it doesn't make sense.

Thank you for spotting this. We have clarified this in the abstract and ….

2. Inclination- should this be 'indication' *This has been corrected.*

3. Could there be a bit more exploration around the reasons drug treatment/other health professionals are sometimes reluctant to engage in cessation work with vulnerable populations, for example, belief it's their only enjoyment/pleasure, their mental health will worsen and the belief that smoking is 'the least of their worries' in comparison with more severe addictions. There's a small qual lit on this which could be cited e.g.

Lawn SJ, Pols RG, Barber JG. Smoking and quitting: a qualitative study with community-living psychiatric clients. Soc Sci Med 2002;54:93–104.

Thank you for this suggestion. We have expanded on this point now in the third paragraph of the introduction citing the Lawn et al study alongside other work.

1. (Baggett et al., 2016). Could you say a tiny bit more about this study- qual/quant, sample, method? Just to contextualise this research…

   More information has been added (4th paragraph of introduction)

2. I want to stop and hopes to stop soon- correct to 'hope' *corrected.*

3. The finding that a large % of those who had tried to stop had used pharmaceutical treatments at above average levels than the UK general population is very interesting. One might have thought the opposite would be true. This suggests that (unless they were self-funding NRT) access to health professionals willing to offer cessation and pharma support to homeless populations is not as much of an issue as might have been presupposed. They have access to the products; but it appears the combination of high dependency and social facilitation is too much and 90% simply end their quit attempt before the day is out. A little more reflection on this interesting finding in the discussion would be good- but also then feed into perhaps a sentence or two more on how given currently e-cig are NOT on prescription in the UK and no universal offer has been established in either general practice or specialist services (one or two services are offering free starter kits but this is haphazard and not standardized), this may well prove the barrier to e-cig use in this population. I'm not sure your

suggestion of vape shops plugging the gap is entirely plausible, but there may be a way of subsidising/paying for use through council budgets in a targeted approach.

Thank you for this suggestion. We have tempered the recommendations regarding vape shops in the penultimate paragraph of the discussion and reflected more on this point and added a further recommendation about subsidising e-cigarettes through Local Authority budgets.

Reviewer 2

This manuscript has two objectives: 1) to describe smoking behaviors among a convenience sample of homeless adults in the UK, 2) to describe perceptions of e-cigarettes use as a cessation aid. The study supports the existing literature by providing yet another piece of evidence on how high the rates of smoking are among homeless adults, as well as highlighting the high rates of nicotine dependence. The study also provides some evidence on perceptions of e-cigarette use among homeless adults. This topic is an important public health topic, and the population focus is appropriate given that it faces a substantial burden from tobacco-related illness. Several considerations come to mind:

Introduction
- Paragraph 4 in the introduction cites the Baggett paper by saying that individuals who used e-cigarettes had greater motivation to quit, and uses this as a foundation for suggesting a role of e-cigarettes in smoking cessation. However, the Baggett paper as well as other observational studies among the general population in the US has found that e-cig users are more likely to make quit attempts but no more likely to be successful at quitting. Therefore to suggest a role for e-cig in successful smoking cessation among homeless adults may be a stretch. I think at this point in the paper, it would be helpful to be clear around the controversies of using e-cigarettes as a cessation aid and the differences in opinions around its potential use as a cessation aid. While the UK has endorsed the use of e-cig for cessation and for potential population harm reduction, this is not the consensus in the US. Moreover, the authors state earlier in the paper that the Stop smoking services (which is an effective natiowide system) is not accessable to this population. What would be the rationale to promote e-cig use versus increasing the reach of a highly effective cessation program with approved cessation aids? I think flushing out some of these controversies in the introduction could be helpful; otherwise the paper comes across as somewhat biased around promoting e-cigarette use.

We have considered this point and expanded paragraph 4 of the introduction to include some of the studies on e-cigarette use and smoking cessation and note the inconsistent findings. We also expand on the role of the SSS in paragraph 5 of the discussion, highlighting the need to embed services in homeless centres and have removed the sentence there relating to non-combustible products.

Results/Methods/Discussion
- Instead of saying that results are in the Tables -- I would summarize key findings in the text of the results section of the manuscript.

It is unclear whether the reviewer wanted us to remove the tables or to describe the findings in the text and retain the tables. We have already summarised the key findings from the table

in the text but have added a few further descriptors. We have retained the tables as we feel that this provides a more visually amenable way of presenting the information to readers.

- The definition of housing status is not clear as written -- for e.g., what does supported accomodation (e.g. shelter??) mean and rough sleeping (e.g. unsheltered?). As much as possible, if it is possible to use universal terms -- e.g. sheltered, unsheltered, living doubled up, living in a short term single room occupnancy hotel etc. would make the descriptions more clear.

We have amended the descriptions of homeless status to make these more clear.

- Similarly, A-levels is not clear to a non UK reader -- either define or simplify.

We have added further clarification to these descriptors.

- Interesting to note that you have up to 15% missing responses from participants -- is it because this survey was not interviewer administered? I wonder about the validity of the response to the harder questions on nicotine dependence among this population with lower literacy rates. Do you have a sense of how frequently participants asked help while they filled out the questionnaire.

As per our procedure section, we gave the participants a chance to have their questionnaire read through with them, but some felt this was too intrusive. Because we want to respect their privacy and free choice we felt these people should be allowed to take part but accepted that maybe not all questions would be answered. We do not feel that unanswered questions indicate that other questions were not well understood because these could have also been left blank. However, the practical benefit of this is also that we will be able to take a look at which questions were most commonly unanswered and reword these for use in future studies.

- The rates of use of medications for cessation is quite high in this sample and similar to that in the general population in the US. This is something interesting to comment on in your discussion. The quit attempt rate is similar to what we have found in our studies among US homeless adults. I think the conclusion here is that this population is interested and engaged in cessation -- and from your findings rates of cessation aids are high -- but the appropriate comparison would be non-homeless adults in the UK -- what are the rates of use of cessation aids in this group?

We have amended and extended paragraph 5 of the discussion to reflect further on this point. We did include a comparison of usage of cessation aids with the UK general, non-homeless population in this paragraph.

- The data on e-cig use is comparable to data on e-cig use in other samples of homeless adults and it would be helfpul to contexutalize your data with those of others -- For the most part, the most common reasons for use of e-cigs are for smoking cessation.

We have added some comparable statistics on this in paragraph 6 of the discussion.

- I also have reservations around recommending e-cig as a smoking cessation aid in the absence of evidence to do so, and also suggesting vape shops as potential venues for smoking cessation. The data to date suggest that the vast majority of e-cig users often use multiple tobacco products, posing a potential concern for poly-use of tobacco. I think the results suggest prior use of e-cig, a willingness to spend some money on e-cig use, but a strong perference for cig use. I'm not sure that these data sugges, therefore, that e-cig should be considered as a smoking cessation aid. My recommendation would be to temper the recommendations around e-cig use as a cessation aid and rather describe the interest in the use of e-cig use and perceptions of risk. I think the bigger question that the paper brings up is that reasons for why this population is not targeted by the NHS Stop smoking program, and what efforts, if any, have been made to increase reach of the program to this population.

As noted in our response to the final point raised by reviewer 1, we have tempered our comments regarding the use of vape shops and made the recommendation to embed SSS within homeless centres.

A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain

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Word count: 3097

COI:

LD has provided consultancy for the pharmaceutical industry (2015, 2017) and acted as an expert witness for an e-cigarette patent infringement case (2015). Between 2011 and 2013 she conducted research for several independent electronic cigarette companies for which the University of East London received funds. The e-cigarette companies involved had no input into the design, conduct or write up of these projects.

AF, LB, SB and AT have no conflicts of interest.

SC in 2018 provided consultancy to the Pacific Life Group relating to smoking prevalence rates and use of reduced risk products.

Funding: No funding received

Abstract

Background: Smoking is a key contributor to health and social inequalities and homeless smoking prevalence rates are 4 times higher than the general population. Research on homelessness and smoking to date has been concentrated predominantly in the US and Australia. This study aimed to describe smoking and quitting behaviour in homeless adult smokers in Great Britain. Data on perceptions of, and willingness to try, e-cigarettes were also gathered.

Methods: Cross sectional survey of 283 adult smokers accessing homeless support services in Kent, the Midlands, London and Edinburgh. Participants answered a four-part survey: i) demographics; ii) current smoking behaviour and dependence (including the Fagerström Test of Cigarette Dependence [FTCD]); iii) previous quit attempts; and iv) e-cigarettes perceptions.

Results: High levels of cigarette dependence were observed (FTCD: M=7.78, sd±0.98). Although desire to quit was high, most had made fewer than 5 quit attempts and 90% of these lasted less than 24 hours. 91.5% reported that others around them also smoked. Previous quit methods used included cold turkey (29.7%), NRT (24.7%), varenicline (22.3%) and bupropion (14.5%). 34% were willing or able to spend £20 or more for an e-cigarette and 82% had tried one in the past although 54% reported that they preferred smoking.

Conclusion: We observed high nicotine dependence, few long-term quit attempts, strong desire to quit and amenability to both traditional cessation methods and e-cigarettes. Community embedded and non-routine approaches to cessation may be promising avenues promoting engagement with the homeless community. Likely barriers to uptake include low affordability, preference for cigarettes and high numbers of smoking acquaintances.

Keywords: Tobacco; smoking; homeless; homelessness; e-cigarettes; inequalities

Introduction

The UK has seen a significant rise in homelessness over recent years (National Audit Office, 2017), exacerbating pre-existing health and socioeconomic divides. There are vast differences in health related outcomes between those who are housed and those who are not, including higher rates of premature death and chronic disease in the latter (Morrison, 2009). Tobacco use continues unabated amongst the homeless with little indication of future decline and is a key contributor to health inequalities (Baggett et al., 2015; Businelle, Cuate, Kesh, Poonawalla & Kendzor, 2013). A key UK public health priority is to reduce health disparities caused by tobacco and promoting smoking cessation is fundamental to this objective (Harker & Cheeseman, 2016; Department of Health, 2017). Smoking prevalence amongst the homeless has been estimated to be around 78% in the UK (Homeless.org, 2015). This is in stark contrast to the general population estimate of 15.1% (ONS, 2018). To date, research focusing on smoking behaviours and interventions amongst the homeless has almost entirely derived from the US and Australia. Research from the UK remains scarce. The purpose of this research was to fill this evidence gap by reporting on current smoking behaviours and cessation attempts in a sample of homeless adults in Great Britain.

At an individual level, homeless adults often present with chronic pre-existing health conditions as well as poor mental health and a history of substance dependence. These factors, in addition to very low or no income, are exacerbated by smoking (Frankish, Hwang & Quantz, 2009; Baggett, et al., 2015). Homeless adults are known to also engage in 'risky smoking practices', in which the acquisition of cigarettes leads to further health risks through cigarette sharing and smoking discarded butts (Aloot, Vredevoe & Brech, 1993; Chen Nguyen, Malesker, & Morrow, 2016; Garner & Ratschen, 2013; Tucker Shadel, Golinelli, Mullins, & Ewing, 2015). There are a number of known individual-psychological and structural-social barriers, which many vulnerable groups encounter during quit attempts (Twyman, Bonevski, Paul & Bryant, 2014). Stress, social pressure and coping with mental health symptoms are key reasons for smoking relapse amongst homeless smokers (Businelle et al., 2013; Chen et

al., 2016). Desire to quit is high (Baggett, Cambell, Chang & Rigotti, 2016; Maddox & Segan, 2017), but quit attempts are often unaided (Garner & Ratschen, 2013). Although the NHS-funded Stop Smoking Services (SSS) offer the best chance of successfully quitting (Bauld, Bell, McCullough, Richardson & Greaves, 2010; NHS Digital, 2018), homeless adults are under-represented in these services. Interview data with homeless smokers suggest that traditional methods of cessation support are perceived as too universal and insensitive to the unique challenges of homeless smokers' daily lives (Collins et al., 2017; Porter et al., 2017).

At a structural and social level, as is the case for many vulnerable groups, smoking is not viewed as a primary concern. High levels of social acceptance coupled with staff concerns over the client's mental wellbeing and fragility can act as major barriers to cessation support (Chen et al., 2016; Twyman, et al., 2014). There is further evidence that in some cases, professionals actively discourage smoking cessation amongst the homeless (Garner & Ratschen, 2013; Maddox & Segan, 2017; Porter et al., 2017). This may be due to beliefs that smoking cessation is impossible for vulnerable groups (Lawn, Pols & Barber, 2002) or that quit attempts may have a negative effect on mental health or other treatments (Guydish et al., 2011; Walsh et al. 2009). Staff have also expressed concern that clients cannot change more than one behaviour at once and that illicit drug use, alcohol dependency or a mental health condition take treatment precedence (Cookson et al., 2014; Garner & Ratschen, 2013). There may also be feelings of inadequacy as some homeless support staff report not feeling sufficiently equipped to assist smokers through a cessation programme (Vijayaraghavan, Hurst & Pierce, 2016). Nevertheless, when offered training, staff have been shown to engage and it can improve knowledge and efficacy in treating tobacco addiction (Vijayaraghavan, Guydish & Pierce, 2016).

Amongst the existing data, there is little focus on the use and potential of novel health innovations for smoking cessation, such as e-cigarettes or technological support (e.g., apps) although several US studies have reported e-cigarette prevalence rates amongst homeless

smokers. In a single shelter convenience sample of 178 homeless smokers in Dallas, Texas, 12% reported the use of e-cigarettes, principally to cut down or quit smoking (Kish et al. 2015). More recently, in a cross-sectional survey of 306 homeless adult smokers in Boston, 24% reported using e-cigarettes in the last month, predominantly for quitting smoking and e-cigarette use was associated with readiness to quit smoking (Baggett et al., 2016). Nevertheless, the efficacy of e-cigarettes for successful smoking cessation remains contested and there are conflicting data from observational cohort studies on the association between e-cigarette use and smoking cessation outcomes (Ghosh & Drummond, 2017). Among randomised controlled trials (RCT) specifically designed to test the efficacy of e-cigarettes for quitting smoking however, the findings are more encouraging. A Cochrane review published in 2016 concluded that smokers using an e-cigarette were more likely to quit compared to those using a placebo at 6 months (Hartmann-Boyce et al., 2016). More recently, a RCT of e-cigarette versus Nicotine Replacement Therapy (NRT) alongside behavioural support in England, reported an almost two-fold increase in 12 month quit rates with e-cigarette (Hajek et al., 2019). The potential of e-cigarettes to reduce smoking prevalence among vulnerable homeless populations is therefore worth exploring. E-cigarettes are now the most popular cessation aid in the UK (West, Brown & Beard, 2018), with newer devices superior to earlier product types such as cigalikes in terms of faster and higher nicotine delivery, factors likely to be essential in a group which is highly nicotine dependent.

The aim of this study was to present data on smoking and quitting behaviour in a sample of adult smokers accessing homeless support services in Great Britain. Specific objectives were to: i) document current smoking patterns, smoking-related behaviours and nicotine dependence; ii) provide an insight into the nature and frequency of quit attempts, types of cessation methods used previously or willing to use in future (including e-cigarettes); iii) gather information relating to e-cigarette perceptions, knowledge and willingness to use.

Methods

Participants

Ethical approval was granted by London South Bank University and all participants provided consent to complete the survey. Adult (18 years +) smokers accessing five homeless centres across the UK were eligible to take part. Based on opportunistic sampling, potential participants were invited to participate by centre staff or a member of the research team. In total 283 homeless adult smokers completed the survey (mean age= 42.7, (±14.02) 238 males: 45 female). Data on the number who were not eligible (e.g. non-smokers) or those who were unable to consent (although this did arise due to intoxication) are not available.

The survey data collected was intended to inform the design of a later intervention study (Cox et al., 2018). This data was collected between January-September 2017. All centres participating in the survey had expressed an interest in being involved in the intervention. Eighty-eight (30.1%) participants were recruited from homeless centres offering support (e.g., cooked meals, showers, internet access) in South-East England (Kent); a further 88 were from Greater London; 65 (22.3%) were from Central London; 28 (9.6%) were from the Midlands (Northampton); 15 were from Edinburgh, Scotland; and 9 (3.1%) did not have a centre identifier on the returned documentation. The majority (N=257; 88%) of the participants described themselves as White European, 15 (5.1%) as Afro-Caribbean, 5 (1.7%) as mixed-race, and 5 (1.7%) of ethnicity categorisations were missing. Ninety-seven percent of participants were in receipt of some type of state benefit. Table 1 presents detailed participant demographic data.

Procedure

Participants accessing the drop-in centres are required to sign in. At this point, staff made enquiries about smoking status and all smokers were invited to take part in the study. Survey packs (with an information sheet and consent form at the front and debrief at the end) were handed out and participants were given the opportunity to ask any questions about the

research. The staff at the centre were fully briefed by the researchers. This happened in all centres, except in Edinburgh where a member of the research team assisted with questionnaire administration. Participants were given assistance in reading the questionnaire if required. Each questionnaire was given a unique identification number to maintain full anonymity. Upon completion, the participant placed the questionnaire into an envelope separate from the completed consent form and handed this in to support staff. All anonymised data was posted back to the research team.

Measures

The questionnaire included four sections.

Section 1: captured information on demographics, including age, gender ethnicity, level of education and housing status.

Section 2: comprised the Fagerström Test of Cigarette Dependence (FTCD; 1991), a 6-item scale assessing cigarette dependence with a scores ranging from 0 (low dependence) to 10 (higher dependence). Three extra questions were also added to this section, relating to types of cigarettes most frequently smoked, whether participants smoked daily and whether people around them also smoke.

Section 3: captured data on previous quitting behaviour. Participants were asked about the number previous quit attempts, methods used, duration of abstinence (if any) and the Motivation to Quit Scale (Kotz, Brown and West; 2013) was included in order to assess motivation to quit for our future study (Cox et al., 2018).

Section 4: related to any previous e-cigarette use. If participants had used tried an e-cigarette, we sought to measure the primary reason for this. Four questions from the ASH (2016) survey were used to gage understanding of e-cigarettes, including understanding of harms, in

addition to these willingness to use in an e-cigarette in the future, and affordability were also captured.

Results

Table 1 presents the participant demographic information, including age, country of birth, educational attainment and housing status. The majority of the participants were from England (83%), were educated up to school-leaving age (16 years; 71.5%) and reported being housed in sheltered accommodation (45%).

Table 1: Participants' demographic information. *Housing status was not collected for participants from Edinburgh (N=15).

Table 1 Demographics	
Mean Age (*mean ±S.D.)*☒	42.7 (±14.02)
Country of birth [n (%)] England Scotland Malawi Ireland Syria Somalia Italy New Zealand U.K Sudan Isle of Man France Missing (incomplete)	 243 (83.2) 12 (4.1) 10 (3.4) 6 (2.1) 3 (1.0) 2 (0.7) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3)
Education [n (%)] No formal education School (up to age 16) College (vocational courses, age 16-18) A-levels (further education, age 16-18) University (age 18+) Missing (incomplete)	 22 (7.5) 187 (64) 26 (8.9) 10 (3.4) 13 (4.5) 25 (8.6)
Housing Status[n (%)]* Supported accommodation / shelter Hostel (nightly basis) Sofa-surfing / squatting / doubled-up Rough sleeping / on the streets Other	 127 (44.9) 65 (23) 51 (18) 23 (8.1) 2 (0.7)

Missing (incomplete)	15 (15.3)

Table 2 presents smoking related information and FTCD scores. Almost all participants were daily smokers (94%). Overall hand-rolled cigarettes were smoked more frequently than ready-made cigarettes (59.2% vs. 23.3%). High cigarette dependence was observed (FTCD: M = 7.78, sd ± 0.98). The majority of participants (55%) reported smoking within 5 minutes of waking and 79.5% stated that the first cigarette of the day would be the hardest to give up. Nearly all (91.5%) participants reported that those around them also smoke.

Table 2: Smoking related data and FTCD. *Both indicates some participants gave two responses instead of one.

Table 2. Smoking data and FTCD *[n (%)]*	
Cigarettes per day (*mean ±S.D.)*☒	19.01 (± 9.55)
Type of cigarette smoked [n (%)] Ready-made Hand-rolled Both Missing (incomplete)	 68 (23.3) 173 (59.2) 41 (14) 1 (0.3)
Time to smoke after waking [n (%)] Within 5 minutes 6-30 mins 31-60 mins After 60 mins	 156 (55.1) 67 (23.7) 36 (12.7) 24 (8.5)
Difficulty refraining from smoking where it is forbidden [n (%)] Yes No	 97 (34.3) 186 (65.7)
Cigarettes hardest to give up [n (%)] First one in the morning Any other *Both	 225 (79.5) 42 (14.8) 16 (5.7)
Smoke more frequently during awakening compared to rest of day? [n (%)] Yes No	 155 (54.8) 117 (41.3)
Smoking when ill [n (%)] Yes No	 132 (46.6) 151 (53.4)
Daily smoking [n (%)] Yes	 274 (93.8)

No Missing (incomplete) *Why do you not smoke every day?* Social smoker Don't have or do not need it	9 (3) 9 (3.1) 5 (1.8) 1 (0.4)
Do people around you smoke? [n (%)] Yes No Missing (incomplete)	 259 (91.5) 14 (4.9) 10 (3.5)

Table 3 presents previous quitting attempts. The majority of quit attempts lasted less than 24 hours (81.3%), and most participants reported that they had tried to quit fewer than five times (54.3%). Desire to quit, however, was reportedly high (75%) although the timing of planned quit attempts (as measured by the MTSS) was unclear.

Table 3: Previous quitting attempts.

Table 3. Quitting Attempts [n (%)]	
Longest period of time gone without smoking	
Less than one day	230 (81.3)
Less than one week	38 (13.4)
Between one week and one month	10 (3.5)
Between one week and three month	2 (0.7)
Between three and six month	1 (0.3)
Twelve months or more	1 (0.3)
Estimated number of previous quits attempts	
Never	71 (25.1)
Once	121 (42.8)
Twice	16 (5.5)
Between 3-5 times	18 (6.3)
Over 10 attempts	5 (1.8)
Missing (incomplete)	52 (18.4)
Desire to quit [n (%)]	
Yes	211 (74.6)
No	71 (25.1)

Descriptive of wanting to stop MTSS [n (%)]	
I don't want to stop smoking	29 (10.2)
I should stop smoking but don't want to	56 (19.8)
I want to stop but have not thought about when	33 (11.7)
I really want to stop but doesn't know when	52 (18.4)
I want to stop and hope to stop soon	69 (24.4)
I really want to stop and intend to stop in the next 3 months	38 (13.4)
I really want to stop and intend to stop in the next month	1 (0.3)
Methods used in previous attempts [n (%)]	
Unassisted (cold-turkey)	84 (29.7)
Nicotine replacement therapies (patches/lozenge)	70 (24.7)
Medication: Varenicline (Champix)	63 (22.3)
Medication: Zyban (Bupropion)	41 (14.5)

Table 4 provides an overview of the participants' e-cigarette knowledge and willingness to try these products in the future. The vast majority of participants (82%) had tried an e-cigarette and the main reason given was to try to stop smoking. However, a very high percentage (54%) also reported preferring tobacco. Thirty percent reported being able/willing to pay up to £10 for an e-cigarette but this was almost matched by 27% stating that would not be able to pay at all. In terms of e-cigarette knowledge, most participants stated that e-cigarettes were 'less harmful than tobacco smoking' (38.9%) with similar numbers reporting 'a lot less harmful' (15.2%) or ' more or equally harmful' (13.8%) and 12.4% were unsure.

Table 4. E-Cigarette usage and knowledge.

Table 4. E-cigarette awareness and willingness to try	
Ever tried e-cigarettes [n (%)] Yes No	 233 (82.3) 46 (16.3)
Reasons for trying e-cigarette [n (%)] To help stop smoking Failed quit attempts To help reduce smoking Save money	 157 (55.5) 44 (15.5) 31 (11) 25 (8.8)

Want to stop but too addicted Healthier Avoid putting those around at risk Just to try	23 (8.1) 15 (5.3) 4 (1.4) 2 (0.7)
Would you be willing to try e-cigarettes [n (%)] Yes No Not applicable	 174 (61.5) 10 (3.5) 88 (31.1)
Reason for not trying or not continuing to use an e-cigarette in the past [n (%)] Preferred cigarettes (hit/flavor/sensation) Cost of the e-cigarette Did not like the experience Did not substitute the experience of smoking	 154 (54.4) 24 (8.5) 1 (0.3) 1 (0.3)
Price able to spend on e-cigarette starter kit [n (%)] £30 £20 £10 £5 Wouldn't be able to pay Not willing to pay	 35 (12.4) 62 (22) 85 (30) 6 (2.1) 75 (27) 2 (0.7)
Rated harmfulness of e-cigarettes compared with smoking [n (%)] More or equally harmful Less harmful A lot less harmful Completely harmless Don't know	 39 (13.8) 110 (38.9) 43 (15.2) 20 (7.1) 35 (12.4)

Discussion

The aim of this study was to contribute to the scant data in the UK on smoking behaviour, quitting, and e-cigarette use from a sample of adult smokers accessing homeless support services in Great Britain. Smoking remains a large contributor to health inequalities in the UK and to date there has been little focus on smoking cessation specifically targeting this group.

Consistent with data from homeless adult smokers in the US and Australia, most smokers smoked daily and were highly nicotine dependent as indicated by the high FTCN scores (mean 7.78 compared with mean scores ranging from 2.8 – 4.6 in general populations of smokers; Fagerström & Furberg, 2008) and high percentage who reported smoking within 5 minutes of waking. Over half reported that they smoked more frequently in the morning compared to the rest of the day and more than three-quarters indicated that their first cigarette of the day would be the hardest to quit, both of which are associated with high levels of tobacco dependency.

The frequency of smoking and difficulties in maintaining cessation may be compounded by the fact that nearly all of the sample reported that people around them smoke. The social environment is particularly important for homeless smokers, and the communal act of smoking plays a central role in bringing people together (Stewart Stevenson, Bruce, Greenberg, Chamberlain, 2015). Peer pressure is also pertinent in this context, as reported across other studies (e.g., Connor, Cook, Herbert, Neal & Williams 2002). Social and supportive environments are therefore essential in helping to drive down tobacco use in homeless communities but there are known barriers. For example, in one study of 22 homeless adults, (Reitzel et al., 2014), homeless shelter proximity was associated with increased negative affect during a quit attempt whereas knowing other quitters has been shown to be positively associated with cessation success (Goldade et al., 2013). A targeted approach to tobacco cessation at service level with group involvement may therefore optimise quit attempts.

Our findings on quit intentions and quit attempts corroborate those from other studies in the US and Australia (e.g. Baggett et al., 2017; Maddox & Seagan 2016). Reported desire to quit smoking was high in our sample but intentions or plans to do so in the near future were very low. The majority of our sample had made a quit attempt that had lasted less than one day which again supports the wider literature suggesting that despite high desire to quit, cessation success is very low. Nevertheless, a notable number of participants (10%) reported not

wanting to quit and a quarter had not made a quit attempt at all. Due to rising health inequalities in the UK, there would be merit in exploring these reasons qualitatively in order to inform how best to engage with such smokers.

Of those who had made a cessation attempt, unassisted quitting (cold-turkey) was reported most frequently; however, a high number (over a quarter) had also used NRT or Varenicline (Champix) and 16% reported that they had used Bupropion (Zyban). Treatment utilisation in this group was higher than in the general population of smokers in England where both over the counter (OTC) NRT and prescribed medications (such as Varenicline and Bupropion) have fallen into disfavour and are currently used in under 15% of quit attempts (West et al., 2018). These findings suggest that many homeless smokers are amenable to using cessation aids, albeit with a low level of success. However, the level of concomitant behavioural support received is unclear. Given that a combination of pharmacotherapy alongside face-to-face behavioural support delivered via the English Stop Smoking Services (SSS) offers the best chances of cessation success, these findings suggest that embedding SSS within centres already being frequented by homeless smokers may prove fruitful.

Another aim of this study was to capture information on how e-cigarettes may support quit attempts as part of a larger intervention study (Cox et al., 2018). Large numbers of our sample said they would try an e-cigarette and the majority had already done so. The percentage reporting ever e-cigarette use was higher than that reported in a similar survey in the US (Kish et al., 2015) although this may reflect the recency of the current data collection. Similarly to US studies of homeless adult smokers (Kish et al., 2014; Baggett et al., 2016) and to a nationwide surveys of smoking in Great Britain (ASH 2018) and the US (Rutten et al., 2015), the main reason given for using an e-cigarette was to quit cigarette smoking. There are many reasons why e-cigarettes may be a pragmatic harm reduction intervention for homeless smokers. For those who are highly nicotine dependent, e-cigarettes allow the users to self-titrate (Dawkins, Kimber, Doig, Feyeraband & Corcoran 2016; Soar, Kimber, McRobbie &

Dawkins, 2018), providing the user with control to self-dose to personally desirable levels. They may also, although this has yet to be confirmed, alleviate some of the social and environmental challenges of being connected with other smokers (e.g., Goldade et al., 2013).

However, despite the possible benefits, a large majority of our sample who had tried an e-cigarette reported not continuing because they preferred cigarettes. A limitation in our data collection is that the exact reasoning of this has not be captured (e.g., lack of a nicotine hit, taste, withdrawal, technical difficulties, types of devices used) and again a future study designed to unpick these issues may help to shape better targeted interventions.

The majority of our participants indicated that they would be able to pay up to £10 for an e-cigarette starter kit, however many reported that they would be unable to pay anything. Given that so many reported a preference for cigarettes, it is possible that even those who said they could pay would not feel motivated to do so. Our results suggest that homeless adults need further support in their cessation attempts and that cessation support should be routinely embedded in homeless centre provision. Although an increasing number of English SSS are becoming 'e-cigarette friendly' (Farrimond & Abraham, 2018), unlike other stop smoking methods, no e-cigarette device has been licenced by the MHRA as a medicine and they are not freely available on prescription. This is likely to be a barrier for homeless smokers who are not willing or able to pay for a starter kit. Should homeless smokers choose to use e-cigarettes as a cessation aid, further information and assistance surrounding the acquisition of an e-cigarette and continued support in using the device is warranted. Although vape shops have been highlighted by some as a potential source of e-cigarette support (Ward et al., 2018) and in other cases effective in helping smokers to quit (Adriaens, Van Gucht & Baeyens, 2018), their effectiveness in assisting those with complex needs is unknown and the start-up costs remain an issue. An alternative approach, if e-cigarettes are demonstrated to be efficacious in this population, might be to subsidise e-cigarette costs using a targeted approach through Local Authority budgets.

In summary, our findings demonstrate high levels of tobacco use but also a willingness to use traditional cessation aids as well as e-cigarettes. High levels of cigarette dependence and the presence of smoking peers may be barriers to quitting. Novel approaches, including the use of e-cigarettes and providing specifically targeted support at a point at which homeless smokers are accessing services, may be one approach to reducing tobacco use.

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A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain

Highlights:

- We sampled smokers accessing homeless services across four areas of Great Britain
- Homeless smokers were highly nicotine dependent and made few quit attempts
- Most quit attempts were cold turkey and rarely exceeded 24 hours
- Over 80% were willing to use an e-cigarette and had tried one in the past.
- Barriers to use: low affordability, preference for cigarettes and friends smoking

A cross sectional survey of smoking characteristics and quitting behaviour from a sample of homeless adults in Great Britain

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LD has provided consultancy for the pharmaceutical industry (2015, 2017) and acted as an expert witness for an e-cigarette patent infringement case (2015). Between 2011 and 2013 she conducted research for several independent electronic cigarette companies for which the University of East London received funds. The e-cigarette companies involved had no input into the design, conduct or write up of these projects.

AF, LB, SB and AT have no conflicts of interest.

SC in 2018 provided consultancy to the Pacific Life Group relating to smoking prevalence rates and use of reduced risk products.

Funding: No funding received

Abstract

Background: Smoking is a key contributor to health and social inequalities and homeless smoking prevalence rates are 4 times higher than the general population. Research on homelessness and smoking to date has been concentrated predominantly in the US and Australia. This study aimed to describe smoking and quitting behaviour in homeless adult smokers in Great Britain. Data on perceptions of, and willingness to try, e-cigarettes were also gathered.

Methods: Cross sectional survey of 283 adult smokers accessing homeless support services in Kent, the Midlands, London and Edinburgh. Participants answered a four-part survey: i) demographics; ii) current smoking behaviour and dependence (including the Fagerström Test of Cigarette Dependence [FTCD]); iii) previous quit attempts; and iv) e-cigarettes perceptions.

Results: High levels of cigarette dependence were observed (FTCD: M=7.78, sd±0.98). Although desire to quit was high, most had made fewer than 5 quit attempts and 90% of these lasted less than 24 hours. 91.5% reported that others around them also smoked. Previous quit methods used included cold turkey (29.7%), NRT (24.7%), varenicline (22.3%) and bupropion (14.5%). 34% were willing or able to spend £20 or more for an e-cigarette and 82% had tried one in the past although 54% reported that they preferred smoking.

Conclusion: We observed high nicotine dependence, few long-term quit attempts, strong desire to quit and amenability to both traditional cessation methods and e-cigarettes. Community embedded and non-routine approaches to cessation may be promising avenues promoting engagement with the homeless community. Likely barriers to uptake include low affordability, preference for cigarettes and high numbers of smoking acquaintances.

Keywords: Tobacco; smoking; homeless; homelessness; e-cigarettes; inequalities

Introduction

The UK has seen a significant rise in homelessness over recent years (National Audit Office, 2017), exacerbating pre-existing health and socioeconomic divides. There are vast differences in health related outcomes between those who are housed and those who are not, including higher rates of premature death and chronic disease in the latter (Morrison, 2009). Tobacco use continues unabated amongst the homeless with little indication of future decline and is a key contributor to health inequalities (Baggett et al., 2015; Businelle, Cuate, Kesh, Poonawalla & Kendzor, 2013). A key UK public health priority is to reduce health disparities caused by tobacco and promoting smoking cessation is fundamental to this objective (Harker & Cheeseman, 2016; Department of Health, 2017). Smoking prevalence amongst the homeless has been estimated to be around 78% in the UK (Homeless.org, 2015). This is in stark contrast to the general population estimate of 15.1% (ONS, 2018). To date, research focusing on smoking behaviours and interventions amongst the homeless has almost entirely derived from the US and Australia. Research from the UK remains scarce. The purpose of this research was to fill this evidence gap by reporting on current smoking behaviours and cessation attempts in a sample of homeless adults in Great Britain.

At an individual level, homeless adults often present with chronic pre-existing health conditions as well as poor mental health and a history of substance dependence. These factors, in addition to very low or no income, are exacerbated by smoking (Frankish, Hwang & Quantz, 2009; Baggett, et al., 2015). Homeless adults are known to also engage in 'risky smoking practices', in which the acquisition of cigarettes leads to further health risks through cigarette sharing and smoking discarded butts (Aloot, Vredevoe & Brech, 1993; Chen Nguyen, Malesker, & Morrow, 2016; Garner & Ratschen, 2013; Tucker Shadel, Golinelli, Mullins, & Ewing, 2015). There are a number of known individual-psychological and structural-social barriers, which many vulnerable groups encounter during quit attempts (Twyman, Bonevski, Paul & Bryant, 2014). Stress, social pressure and coping with mental health symptoms are key reasons for smoking relapse amongst homeless smokers (Businelle et al., 2013; Chen et

al., 2016). Desire to quit is high (Baggett, Cambell, Chang & Rigotti, 2016; Maddox & Segan, 2017), but quit attempts are often unaided (Garner & Ratschen, 2013). Although the NHS-funded Stop Smoking Services (SSS) offer the best chance of successfully quitting (Bauld, Bell, McCullough, Richardson & Greaves, 2010; NHS Digital, 2018), homeless adults are under-represented in these services. Interview data with homeless smokers suggest that traditional methods of cessation support are perceived as too universal and insensitive to the unique challenges of homeless smokers' daily lives (Collins et al., 2017; Porter et al., 2017).

At a structural and social level, as is the case for many vulnerable groups, smoking is not viewed as a primary concern. High levels of social acceptance coupled with staff concerns over the client's mental wellbeing and fragility can act as major barriers to cessation support (Chen et al., 2016; Twyman, et al., 2014). There is further evidence that in some cases, professionals actively discourage smoking cessation amongst the homeless (Garner & Ratschen, 2013; Maddox & Segan, 2017; Porter et al., 2017). This may be due to beliefs that smoking cessation is impossible for vulnerable groups (Lawn, Pols & Barber, 2002) or that quit attempts may have a negative effect on mental health or other treatments (Guydish et al., 2011; Walsh et al. 2009). Staff have also expressed concern that clients cannot change more than one behaviour at once and that illicit drug use, alcohol dependency or a mental health condition take treatment precedence (Cookson et al., 2014; Garner & Ratschen, 2013). There may also be feelings of inadequacy as some homeless support staff report not feeling sufficiently equipped to assist smokers through a cessation programme (Vijayaraghavan, Hurst & Pierce, 2016). Nevertheless, when offered training, staff have been shown to engage and it can improve knowledge and efficacy in treating tobacco addiction (Vijayaraghavan, Guydish & Pierce, 2016).

Amongst the existing data, there is little focus on the use and potential of novel health innovations for smoking cessation, such as e-cigarettes or technological support (e.g., apps) although several US studies have reported e-cigarette prevalence rates amongst homeless

smokers. In a single shelter convenience sample of 178 homeless smokers in Dallas, Texas, 12% reported the use of e-cigarettes, principally to cut down or quit smoking (Kish et al. 2015). More recently, in a cross-sectional survey of 306 homeless adult smokers in Boston, 24% reported using e-cigarettes in the last month, predominantly for quitting smoking and e-cigarette use was associated with readiness to quit smoking (Baggett et al., 2016). Nevertheless, the efficacy of e-cigarettes for successful smoking cessation remains contested and there are conflicting data from observational cohort studies on the association between e-cigarette use and smoking cessation outcomes (Ghosh & Drummond, 2017). Among randomised controlled trials (RCT) specifically designed to test the efficacy of e-cigarettes for quitting smoking however, the findings are more encouraging. A Cochrane review published in 2016 concluded that smokers using an e-cigarette were more likely to quit compared to those using a placebo at 6 months (Hartmann-Boyce et al., 2016). More recently, a RCT of e-cigarette versus Nicotine Replacement Therapy (NRT) alongside behavioural support in England, reported an almost two-fold increase in 12 month quit rates with e-cigarette (Hajek et al., 2019). The potential of e-cigarettes to reduce smoking prevalence among vulnerable homeless populations is therefore worth exploring. E-cigarettes are now the most popular cessation aid in the UK (West, Brown & Beard, 2018), with newer devices superior to earlier product types such as cigalikes in terms of faster and higher nicotine delivery, factors likely to be essential in a group which is highly nicotine dependent.

The aim of this study was to present data on smoking and quitting behaviour in a sample of adult smokers accessing homeless support services in Great Britain. Specific objectives were to: i) document current smoking patterns, smoking-related behaviours and nicotine dependence; ii) provide an insight into the nature and frequency of quit attempts, types of cessation methods used previously or willing to use in future (including e-cigarettes); iii) gather information relating to e-cigarette perceptions, knowledge and willingness to use.

Methods

Participants

Ethical approval was granted by London South Bank University and all participants provided consent to complete the survey. Adult (18 years +) smokers accessing five homeless centres across the UK were eligible to take part. Based on opportunistic sampling, potential participants were invited to participate by centre staff or a member of the research team. In total 283 homeless adult smokers completed the survey (mean age= 42.7, (±14.02) 238 males: 45 female). Data on the number who were not eligible (e.g. non-smokers) or those who were unable to consent (although this did arise due to intoxication) are not available.

The survey data collected was intended to inform the design of a later intervention study (Cox et al., 2018). This data was collected between January-September 2017. All centres participating in the survey had expressed an interest in being involved in the intervention. Eighty-eight (30.1%) participants were recruited from homeless centres offering support (e.g., cooked meals, showers, internet access) in South-East England (Kent); a further 88 were from Greater London; 65 (22.3%) were from Central London; 28 (9.6%) were from the Midlands (Northampton); 15 were from Edinburgh, Scotland; and 9 (3.1%) did not have a centre identifier on the returned documentation. The majority (N=257; 88%) of the participants described themselves as White European, 15 (5.1%) as Afro-Caribbean, 5 (1.7%) as mixed-race, and 5 (1.7%) of ethnicity categorisations were missing. Ninety-seven percent of participants were in receipt of some type of state benefit. Table 1 presents detailed participant demographic data.

Procedure

Participants accessing the drop-in centres are required to sign in. At this point, staff made enquiries about smoking status and all smokers were invited to take part in the study. Survey packs (with an information sheet and consent form at the front and debrief at the end) were handed out and participants were given the opportunity to ask any questions about the

research. The staff at the centre were fully briefed by the researchers. This happened in all centres, except in Edinburgh where a member of the research team assisted with questionnaire administration. Participants were given assistance in reading the questionnaire if required. Each questionnaire was given a unique identification number to maintain full anonymity. Upon completion, the participant placed the questionnaire into an envelope separate from the completed consent form and handed this in to support staff. All anonymised data was posted back to the research team.

Measures

The questionnaire included four sections.

Section 1: captured information on demographics, including age, gender ethnicity, level of education and housing status.

Section 2: comprised the Fagerström Test of Cigarette Dependence (FTCD; 1991), a 6-item scale assessing cigarette dependence with a scores ranging from 0 (low dependence) to 10 (higher dependence). Three extra questions were also added to this section, relating to types of cigarettes most frequently smoked, whether participants smoked daily and whether people around them also smoke.

Section 3: captured data on previous quitting behaviour. Participants were asked about the number previous quit attempts, methods used, duration of abstinence (if any) and the Motivation to Quit Scale (Kotz, Brown and West; 2013) was included in order to assess motivation to quit for our future study (Cox et al., 2018).

Section 4: related to any previous e-cigarette use. If participants had used tried an e-cigarette, we sought to measure the primary reason for this. Four questions from the ASH (2016) survey were used to gage understanding of e-cigarettes, including understanding of harms, in

addition to these willingness to use in an e-cigarette in the future, and affordability were also captured.

Results

Table 1 presents the participant demographic information, including age, country of birth, educational attainment and housing status. The majority of the participants were from England (83%), were educated up to school-leaving age (16 years; 71.5%) and reported being housed in sheltered accommodation (45%).

Table 1: Participants' demographic information. *Housing status was not collected for participants from Edinburgh (N=15).

Table 1 Demographics	
Mean Age (*mean ±S.D.)*☒	42.7 (±14.02)
Country of birth [n (%)] England Scotland Malawi Ireland Syria Somalia Italy New Zealand U.K Sudan Isle of Man France Missing (incomplete)	 243 (83.2) 12 (4.1) 10 (3.4) 6 (2.1) 3 (1.0) 2 (0.7) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3) 1 (0.3)
Education [n (%)] No formal education School (up to age 16) College (vocational courses, age 16-18) A-levels (further education, age 16-18) University (age 18+) Missing (incomplete)	 22 (7.5) 187 (64) 26 (8.9) 10 (3.4) 13 (4.5) 25 (8.6)
Housing Status[n (%)]* Supported accommodation / shelter Hostel (nightly basis) Sofa-surfing / squatting / doubled-up Rough sleeping / on the streets Other	 127 (44.9) 65 (23) 51 (18) 23 (8.1) 2 (0.7)

Missing (incomplete)	15 (15.3)

Table 2 presents smoking related information and FTCD scores. Almost all participants were daily smokers (94%). Overall hand-rolled cigarettes were smoked more frequently than ready-made cigarettes (59.2% vs. 23.3%). High cigarette dependence was observed (FTCD: M = 7.78, sd ± 0.98). The majority of participants (55%) reported smoking within 5 minutes of waking and 79.5% stated that the first cigarette of the day would be the hardest to give up. Nearly all (91.5%) participants reported that those around them also smoke.

Table 2: Smoking related data and FTCD. *Both indicates some participants gave two responses instead of one.

Table 2. Smoking data and FTCD *[n (%)]*	
Cigarettes per day (*mean ±S.D.)*☒	19.01 (± 9.55)
Type of cigarette smoked [n (%)] Ready-made Hand-rolled Both Missing (incomplete)	 68 (23.3) 173 (59.2) 41 (14) 1 (0.3)
Time to smoke after waking [n (%)] Within 5 minutes 6-30 mins 31-60 mins After 60 mins	 156 (55.1) 67 (23.7) 36 (12.7) 24 (8.5)
Difficulty refraining from smoking where it is forbidden [n (%)] Yes No	 97 (34.3) 186 (65.7)
Cigarettes hardest to give up [n (%)] First one in the morning Any other *Both	 225 (79.5) 42 (14.8) 16 (5.7)
Smoke more frequently during awakening compared to rest of day? [n (%)] Yes No	 155 (54.8) 117 (41.3)
Smoking when ill [n (%)] Yes No	 132 (46.6) 151 (53.4)
Daily smoking [n (%)] Yes	 274 (93.8)

No	9 (3)
Missing (incomplete)	9 (3.1)
Why do you not smoke every day?	
Social smoker	5 (1.8)
Don't have or do not need it	1 (0.4)
Do people around you smoke? [n (%)]	
Yes	259 (91.5)
No	14 (4.9)
Missing (incomplete)	10 (3.5)

Table 3 presents previous quitting attempts. The majority of quit attempts lasted less than 24 hours (81.3%), and most participants reported that they had tried to quit fewer than five times (54.3%). Desire to quit, however, was reportedly high (75%) although the timing of planned quit attempts (as measured by the MTSS) was unclear.

Table 3: Previous quitting attempts.

Table 3. Quitting Attempts [n (%)]	
Longest period of time gone without smoking	
Less than one day	230 (81.3)
Less than one week	38 (13.4)
Between one week and one month	10 (3.5)
Between one week and three month	2 (0.7)
Between three and six month	1 (0.3)
Twelve months or more	1 (0.3)
Estimated number of previous quits attempts	
Never	71 (25.1)
Once	121 (42.8)
Twice	16 (5.5)
Between 3-5 times	18 (6.3)
Over 10 attempts	5 (1.8)
Missing (incomplete)	52 (18.4)
Desire to quit [n (%)]	
Yes	211 (74.6)
No	71 (25.1)

Descriptive of wanting to stop MTSS [n (%)]	
I don't want to stop smoking	29 (10.2)
I should stop smoking but don't want to	56 (19.8)
I want to stop but have not thought about when	33 (11.7)
I really want to stop but doesn't know when	52 (18.4)
I want to stop and hope to stop soon	69 (24.4)
I really want to stop and intend to stop in the next 3 months	38 (13.4)
I really want to stop and intend to stop in the next month	1 (0.3)
Methods used in previous attempts [n (%)]	
Unassisted (cold-turkey)	84 (29.7)
Nicotine replacement therapies (patches/lozenge)	70 (24.7)
Medication: Varenicline (Champix)	63 (22.3)
Medication: Zyban (Bupropion)	41 (14.5)

Table 4 provides an overview of the participants' e-cigarette knowledge and willingness to try these products in the future. The vast majority of participants (82%) had tried an e-cigarette and the main reason given was to try to stop smoking. However, a very high percentage (54%) also reported preferring tobacco. Thirty percent reported being able/willing to pay up to £10 for an e-cigarette but this was almost matched by 27% stating that would not be able to pay at all. In terms of e-cigarette knowledge, most participants stated that e-cigarettes were 'less harmful than tobacco smoking' (38.9%) with similar numbers reporting 'a lot less harmful' (15.2%) or ' more or equally harmful' (13.8%) and 12.4% were unsure.

Table 4. E-Cigarette usage and knowledge.

Table 4. E-cigarette awareness and willingness to try	
Ever tried e-cigarettes [n (%)] Yes No	 233 (82.3) 46 (16.3)
Reasons for trying e-cigarette [n (%)] To help stop smoking Failed quit attempts To help reduce smoking Save money	 157 (55.5) 44 (15.5) 31 (11) 25 (8.8)

Want to stop but too addicted Healthier Avoid putting those around at risk Just to try	23 (8.1) 15 (5.3) 4 (1.4) 2 (0.7)
Would you be willing to try e-cigarettes [n (%)] Yes No Not applicable	 174 (61.5) 10 (3.5) 88 (31.1)
Reason for not trying or not continuing to use an e-cigarette in the past [n (%)] Preferred cigarettes (hit/flavor/sensation) Cost of the e-cigarette Did not like the experience Did not substitute the experience of smoking	 154 (54.4) 24 (8.5) 1 (0.3) 1 (0.3)
Price able to spend on e-cigarette starter kit [n (%)] £30 £20 £10 £5 Wouldn't be able to pay Not willing to pay	 35 (12.4) 62 (22) 85 (30) 6 (2.1) 75 (27) 2 (0.7)
Rated harmfulness of e-cigarettes compared with smoking [n (%)] More or equally harmful Less harmful A lot less harmful Completely harmless Don't know	 39 (13.8) 110 (38.9) 43 (15.2) 20 (7.1) 35 (12.4)

Discussion

The aim of this study was to contribute to the scant data in the UK on smoking behaviour, quitting, and e-cigarette use from a sample of adult smokers accessing homeless support services in Great Britain. Smoking remains a large contributor to health inequalities in the UK and to date there has been little focus on smoking cessation specifically targeting this group.

Consistent with data from homeless adult smokers in the US and Australia, most smokers smoked daily and were highly nicotine dependent as indicated by the high FTCN scores (mean 7.78 compared with mean scores ranging from 2.8 – 4.6 in general populations of smokers; Fagerström & Furberg, 2008) and high percentage who reported smoking within 5 minutes of waking. Over half reported that they smoked more frequently in the morning compared to the rest of the day and more than three-quarters indicated that their first cigarette of the day would be the hardest to quit, both of which are associated with high levels of tobacco dependency.

The frequency of smoking and difficulties in maintaining cessation may be compounded by the fact that nearly all of the sample reported that people around them smoke. The social environment is particularly important for homeless smokers, and the communal act of smoking plays a central role in bringing people together (Stewart Stevenson, Bruce, Greenberg, Chamberlain, 2015). Peer pressure is also pertinent in this context, as reported across other studies (e.g., Connor, Cook, Herbert, Neal & Williams 2002). Social and supportive environments are therefore essential in helping to drive down tobacco use in homeless communities but there are known barriers. For example, in one study of 22 homeless adults, (Reitzel et al., 2014), homeless shelter proximity was associated with increased negative affect during a quit attempt whereas knowing other quitters has been shown to be positively associated with cessation success (Goldade et al., 2013). A targeted approach to tobacco cessation at service level with group involvement may therefore optimise quit attempts.

Our findings on quit intentions and quit attempts corroborate those from other studies in the US and Australia (e.g. Baggett et al., 2017; Maddox & Seagan 2016). Reported desire to quit smoking was high in our sample but intentions or plans to do so in the near future were very low. The majority of our sample had made a quit attempt that had lasted less than one day which again supports the wider literature suggesting that despite high desire to quit, cessation success is very low. Nevertheless, a notable number of participants (10%) reported not

wanting to quit and a quarter had not made a quit attempt at all. Due to rising health inequalities in the UK, there would be merit in exploring these reasons qualitatively in order to inform how best to engage with such smokers.

Of those who had made a cessation attempt, unassisted quitting (cold-turkey) was reported most frequently; however, a high number (over a quarter) had also used NRT or Varenicline (Champix) and 16% reported that they had used Bupropion (Zyban). Treatment utilisation in this group was higher than in the general population of smokers in England where both over the counter (OTC) NRT and prescribed medications (such as Varenicline and Bupropion) have fallen into disfavour and are currently used in under 15% of quit attempts (West et al., 2018). These findings suggest that many homeless smokers are amenable to using cessation aids, albeit with a low level of success. However, the level of concomitant behavioural support received is unclear. Given that a combination of pharmacotherapy alongside face-to-face behavioural support delivered via the English Stop Smoking Services (SSS) offers the best chances of cessation success, these findings suggest that embedding SSS within centres already being frequented by homeless smokers may prove fruitful.

Another aim of this study was to capture information on how e-cigarettes may support quit attempts as part of a larger intervention study (Cox et al., 2018). Large numbers of our sample said they would try an e-cigarette and the majority had already done so. The percentage reporting ever e-cigarette use was higher than that reported in a similar survey in the US (Kish et al., 2015) although this may reflect the recency of the current data collection. Similarly to US studies of homeless adult smokers (Kish et al., 2014; Baggett et al., 2016) and to a nationwide surveys of smoking in Great Britain (ASH 2018) and the US (Rutten et al., 2015), the main reason given for using an e-cigarette was to quit cigarette smoking. There are many reasons why e-cigarettes may be a pragmatic harm reduction intervention for homeless smokers. For those who are highly nicotine dependent, e-cigarettes allow the users to self-titrate (Dawkins, Kimber, Doig, Feyeraband & Corcoran 2016; Soar, Kimber, McRobbie &

Dawkins, 2018), providing the user with control to self-dose to personally desirable levels. They may also, although this has yet to be confirmed, alleviate some of the social and environmental challenges of being connected with other smokers (e.g., Goldade et al., 2013).

However, despite the possible benefits, a large majority of our sample who had tried an e-cigarette reported not continuing because they preferred cigarettes. A limitation in our data collection is that the exact reasoning of this has not be captured (e.g., lack of a nicotine hit, taste, withdrawal, technical difficulties, types of devices used) and again a future study designed to unpick these issues may help to shape better targeted interventions.

The majority of our participants indicated that they would be able to pay up to £10 for an e-cigarette starter kit, however many reported that they would be unable to pay anything. Given that so many reported a preference for cigarettes, it is possible that even those who said they could pay would not feel motivated to do so. Our results suggest that homeless adults need further support in their cessation attempts and that cessation support should be routinely embedded in homeless centre provision. Although an increasing number of English SSS are becoming 'e-cigarette friendly' (Farrimond & Abraham, 2018), unlike other stop smoking methods, no e-cigarette device has been licenced by the MHRA as a medicine and they are not freely available on prescription. This is likely to be a barrier for homeless smokers who are not willing or able to pay for a starter kit. Should homeless smokers choose to use e-cigarettes as a cessation aid, further information and assistance surrounding the acquisition of an e-cigarette and continued support in using the device is warranted. Although vape shops have been highlighted by some as a potential source of e-cigarette support (Ward et al., 2018) and in other cases effective in helping smokers to quit (Adriaens, Van Gucht & Baeyens, 2018), their effectiveness in assisting those with complex needs is unknown and the start-up costs remain an issue. An alternative approach, if e-cigarettes are demonstrated to be efficacious in this population, might be to subsidise e-cigarette costs using a targeted approach through Local Authority budgets.

In summary, our findings demonstrate high levels of tobacco use but also a willingness to use traditional cessation aids as well as e-cigarettes. High levels of cigarette dependence and the presence of smoking peers may be barriers to quitting. Novel approaches, including the use of e-cigarettes and providing specifically targeted support at a point at which homeless smokers are accessing services, may be one approach to reducing tobacco use.

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Author disclosures

Role of funding: None.

Contributors: Authors LD, SC, AF & LB conceptualised the project. SC and AF were responsible for the data collection. SC and SB conducted the statistical analysis. LD, SC and SB conducted the literature reviews and wrote the first draft manuscript. AT is the Research Fellow on the main study and is in charge of the day to day running of the study. All authors contributed to and have approved the final manuscript.

Conflicts of interest: LD has provided consultancy for the pharmaceutical industry (2015, 2017) and acted as an expert witness for an e-cigarette patent infringement case (2015). Between 2011 and 2013 she conducted research for several independent electronic cigarette companies for which the University of East London received funds. The e-cigarette companies involved had no input into the design, conduct or write up of these projects.

AF, LB, SB and AT have no conflicts of interest.

SC in 2018 provided consultancy to the pacific life group relating to smoking prevalence rates and use of reduced risk products